AD-8923-CC

Remote Controller
(CC-Link)

INSTRUCTION MANUAL

A&D Company, Limited

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1. INTRODUCTION

This manual describes how the AD-8923-CC remote controller works and how to get the most out of it in terms of performance.
Read this manual thoroughly before using the AD-8923-CC and keep it at hand for future reference.

1.1. Features

Connecting the AD-8923-CC remote controller and the AD-4212C series production weighing unit will enable transmission of the weight data to a PLC using CC-Link.

- Displays the weight data transmitted from the AD-4212C.
- Can change the weighing speed of the AD-4212C, calibrate the AD-4212C using an external calibration weight and share the power supply with the AD-4212C.

Note

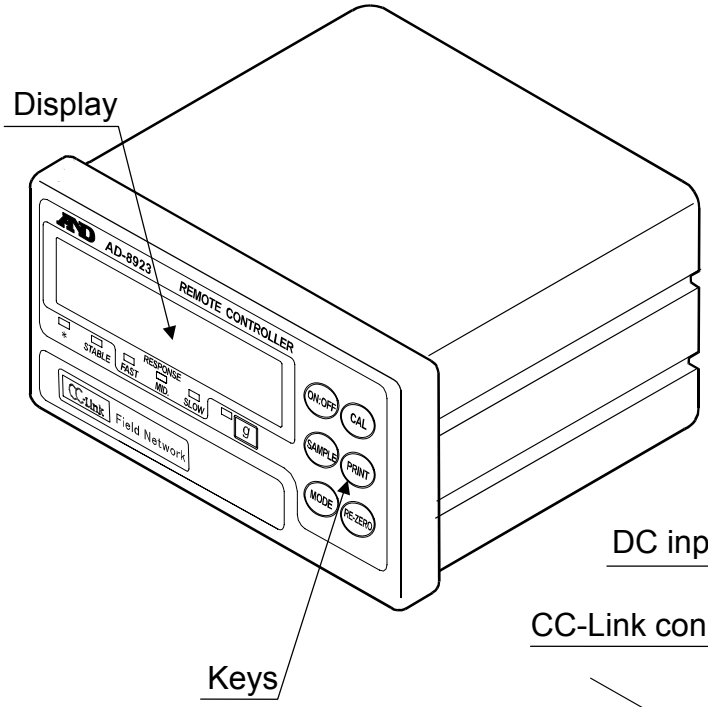
- **When the AD-4212C is used as the weighing instrument, connecting power to either the AD-8923-CC or the AD-4212C will supply power to both devices. Refer to "3.3. Turning the power on."**

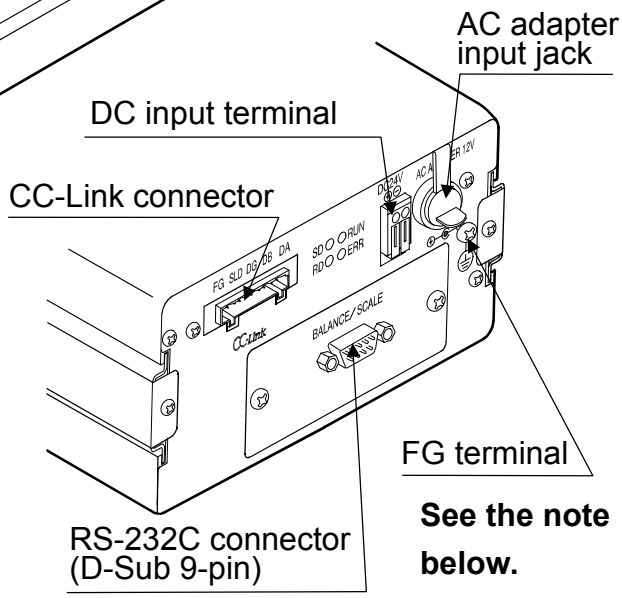
- Using the CC-Link interface, one CC-Link master station can control up to 42 units consisting of an AD-8923-CC and AD-4212C, to receive data or perform re-zeroing.

Note

- **CC-Link is a high-speed field network able to simultaneously handle both control and information data. With a high communication speed of 10 Mbps, CC-Link can achieve the maximum transmission distance of 100 meters and connect to 64 stations.**
  When a CC-Link network is configured using the AD-8923-CC, the maximum number of stations (or units) will be 42.

2. DESCRIPTION OF EACH PART

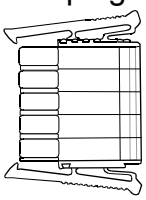




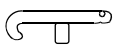
Rear View

Accessories

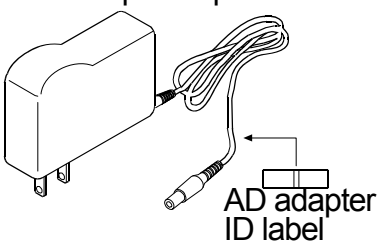
CC-Link plug 1 pc.



Connector operation lever 1 pc.



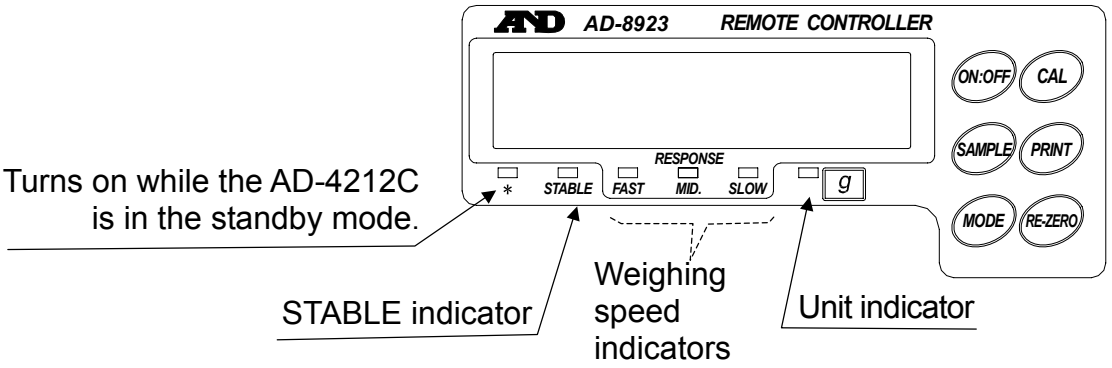
AC adapter 1 pc.



Note

- **When the AD-8923-CC is to be built into a weighing system, be sure to ground the FG terminal.**
- **Please confirm that the AC adapter type is correct for your local voltage and receptacle type.**

2.1. Display



- Displays the weight data received. When the unit is “g” (gram), the unit indicator turns on.
- When the weight value is stable (the header of the weight data received is “ST”), the STABLE indicator turns on.
- If the AD-8923-CC does not receive the weight data for two seconds or more, [- - - - -] is displayed (Bar display).
- Displays the AD-4212C weighing speed that is currently set, by turning on the corresponding indicator.

2.2. Keys

- Operates the AD-4212C. For details, refer to “3.4. Operation”.
- To enter the function setting of the AD-8923-CC, press the [CAL] key while holding down the [ON:OFF] key. For details, refer to “4. FUNCTION SETTING”.)

2.3. Connectors

- RS-232C connector ..... D-Sub 9-pin (male)
  Used to connect to the AD-4212C weighing unit. For details, refer to “5. RS-232C CONNECTOR”.
- CC-Link connector ..... 5-pin (male)
  Used to connect to other AD-8923-CCs, PLCs or other CC-Link devices. For details, refer to “6. CC-Link CONNECTOR”.
- DC input terminal (24 DCV) / AC adapter input jack
  Either power supply can be used. For details, refer to “3.3. Turing the power on”.

3. CONNECTION

3.1. Setting the AD-4212C and the AD-8923-CC

Set the following items so that the AD-4212C and the AD-8923-CC have the same value for each item.

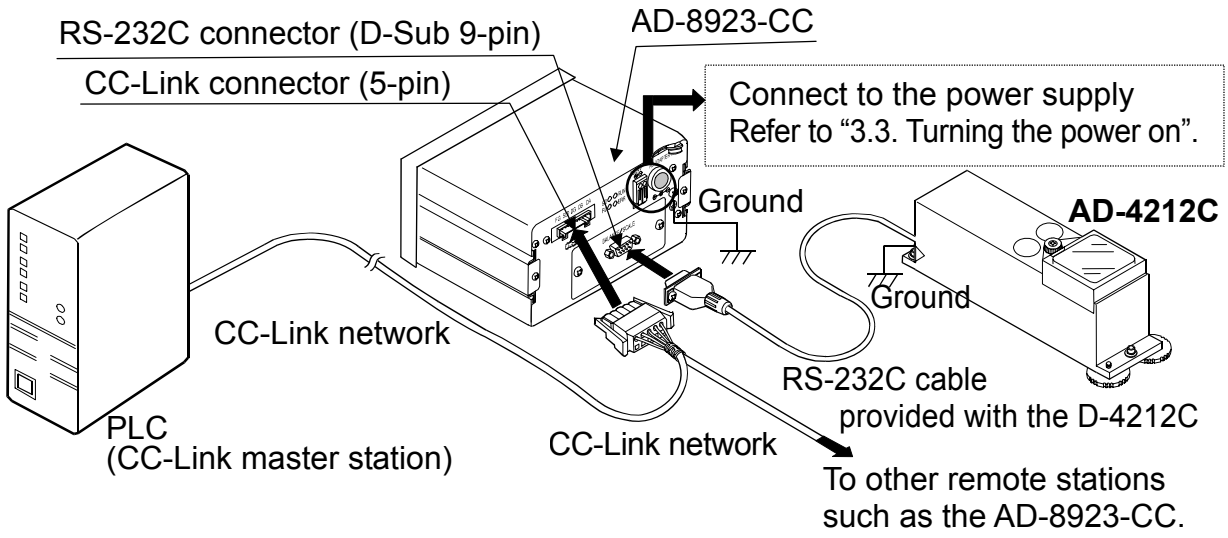
Item	AD-4212C	AD-8923-CC
Baud rate	600, 1200, 2400*, 4800, 9600, 19200 bps	
Data bits, parity	7 bits EVEN*	
Stop bits	1 bit*	
Terminator	<CR><LF>*	
Data format	A&D standard format	–
Communication control	No RTS/CTS control	–
Data output mode	Stream mode	–

***** Factory setting for the AD-8923-CC. The factory setting for the AD-4212C is the same unless otherwise specified.

3.2. Connecting the cables

Connect the cables using the connectors located on the rear of the AD-8923-CC.

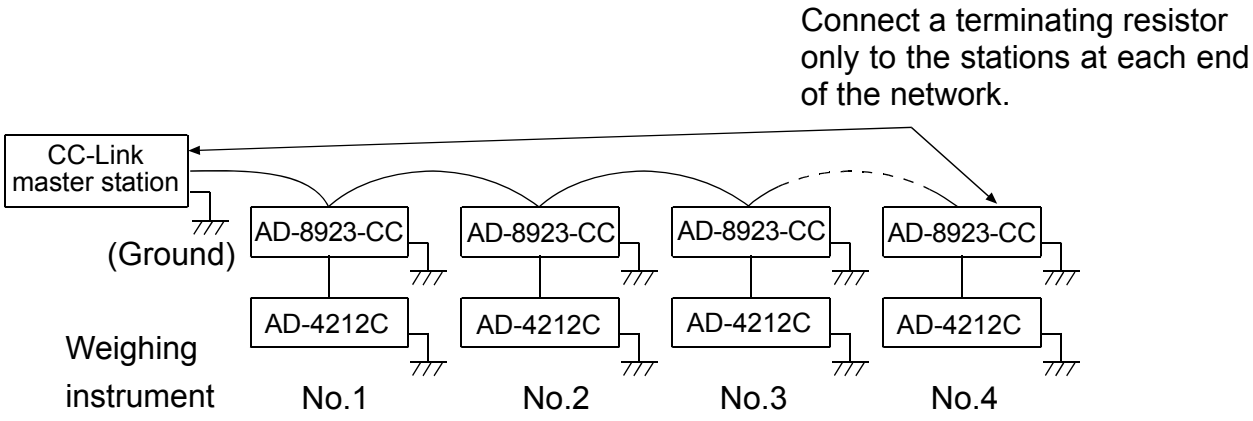
Connection example to the AD-4212C and a PLC



Note

- **Be sure to ground the AD-4212C and the AD-8923-CC.**

Connection example to the CC-Link network (weighing instruments No.1 through No.4)



- The value of the terminating resistor varies depending on the CC-Link cable used.
- Use the same resistor at each end of the network.

Cable	FANC-SB	FANC-110SBH	FANC-SBH
Terminating resistor	110Ω 1/2 W		130Ω 1/2 W

Terminating resistors are not provided.

3.3. Turning the power on

As a power supply, an external 24-VDC power supply (24 VDC±10% / 700mA) or a 12-VDC AC adapter can be used.

Note

- **When the AD-4212C is used, connecting power to either the AD-8923-CC or the AD-4212C will supply power to both devices. So, instead of the AD-8923-CC, using the AC adapter on the AD-4212C will supply power to the AD-8923-CC.**
  If the power is connected to both, no problems occur because the power to be used is selected automatically.

When the external 24-VDC power supply is used

Connect an external 24-VDC power supply to the DC input terminal located on the rear of the AD-8923-CC.

Precautions on using the external power supply

⚠ CAUTION

- Use a power supply within the rated voltage range (24 VDC±10%). Never use a power supply with a voltage exceeding the rated range.
  - It may cause damage or heat buildup.
  - The AD-8923-CC may not function properly.

- Ground the FG terminal of the switching power supply used.
  - To avoid electrical shock and increase the system safety.
  - To increase the resistance against noises.

- Do not share the power line with other devices.
  - Strong noises introduced from other devices may cause damage to the AD-8923-CC.
  - Inrush current from other devices may cause the AD-8923-CC not to start up properly.
  - Circuit configuration of the AD-8923-CC may affect other devices to prevent them from functioning properly.

- Select a switching power supply with a capacity of approximately 700mA for each AD-8923-CC. Note that the AD-8923-CC may not start up with a capacity less than 700mA.
  - If the power supply capacity is not sufficient, the AD-8923-CC may not function properly.

- Be sure to add a noise filter on the front end of the switching power supply and ground the FG terminal.
  - This will increase the resistance against noises.

- Be sure to ground the FG terminal of the AD-8923-CC and the AD-4212C.
  - This will increase the resistance against noises.

Cable connection

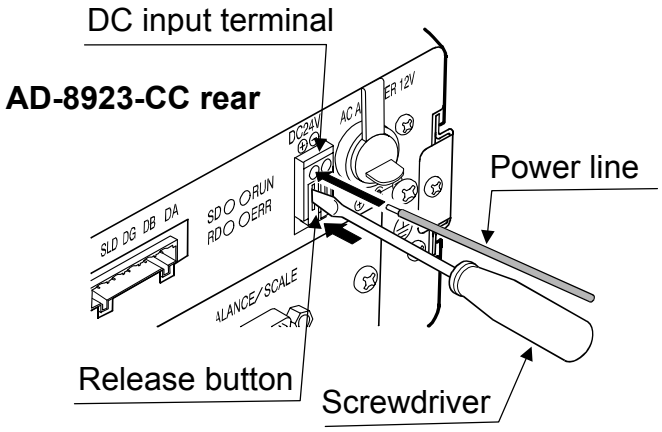
⚠ CAUTION

Before inserting the power line, make sure that the power to the AD-8923-CC is turned off.

(1) Inserting the power line

Press down the release button on the DC input terminal using a screwdriver and insert the power line.

The recommended stripping length for the power line is 10 mm.



Applicable wire range

- Single wire: ϕ1.0 mm (AWG 26) to ϕ1.2 mm (AWG 16)
- Twisted wire: 0.3 mm^2 (AWG 22) to 0.75 mm^2 (AWG 20)

  Individual wire diameter ϕ0.18 mm or greater

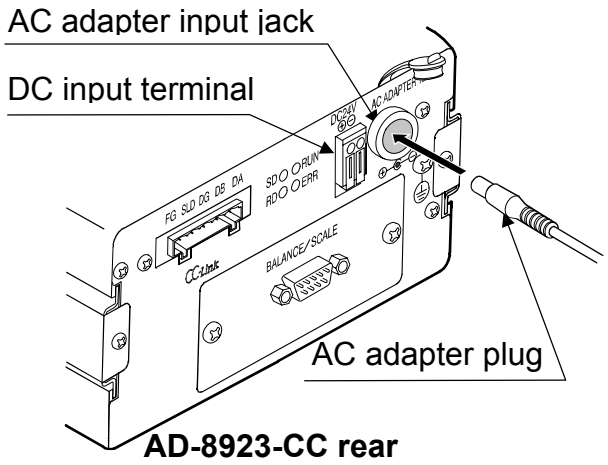
(2) Securing or removing the power line

To secure the power line, return the release button to the initial position using the screwdriver. The power line will be locked.

To remove the power line, press the release button again using the screwdriver, unlocking the power line.

When the AC adapter is used

Insert the AC adapter plug into the AC adapter input jack located on the rear of the AD-8923-CC and insert the AC adapter into an electrical outlet.



3.4. Operation

- Displays the data transmitted by the weighing instrument connected.
- The AD-8923-CC key functions when connected to a weighing instrument are listed below: (e.g. when the AD-4212C is connected)

Model	Keys of the AD-8923-CC					
	ON:OFF	**CAL**	**SAMPLE**	**PRINT**	**MODE**	**RE-ZERO**
AD-4212C	Switches between the weighing mode and the standby mode.	Enters the calibration mode using a weight.	Switches the minimum display.	Used for the function setting mode and calibration mode.	Switches the weighing speed.	Sets the display to zero.

3.5. Calibrating the AD-4212C

The following is the calibration procedure when the AD-4212C is connected. (A calibration weight is used.)

Caution

- Do not allow vibration, drafts or temperature change to affect the AD-4212C during calibration.

Caution on using an external calibration weight

- The accuracy of the weight can influence the accuracy of weighing. Select an appropriate weight as listed below.
  A calibration weight of 200 g (conforming to OIML, Class E2 or equivalent) is provided with the AD-4212C as a standard accessory.

Weighing instrument	Usable calibration weight
AD-4212C-300	50g, 100g, **200 g**, 300g
AD-4212C-600	50g, 100g, **200 g**, 300g, 400 g, 500 g, 600 g
AD-4212C-3000	50g, 100g, **200 g**, 300g, 400 g, 500 g, 1000 g, 2000g, 3000g
AD-4212C-6000	**200 g**, 500 g, 1000 g, 2000g, 3000g, 4000 g, 5000 g, 6000 g

The calibration weight in bold type: factory setting

Display

- This indicator means “the AD-4212C is measuring calibration data”. Do not allow vibration, drafts or other external disturbances to affect AD-4212C while this indicator is displayed.

Calibration procedure

Calibrates the AD-4212C using the calibration weight.

Operation

1. Warm up the AD-4212C for 30 minutes or more with nothing on the pan.

2. Press the CAL key. `CAL 0` is displayed.
   - If you want to cancel calibration, press the CAL key. The display will return to the weighing mode.
   - If you want to change the calibration mass value, press the SAMPLE key.
     Press the RE-ZERO key to select the mass value, and press the PRINT key to store it. `CAL 0` is displayed.

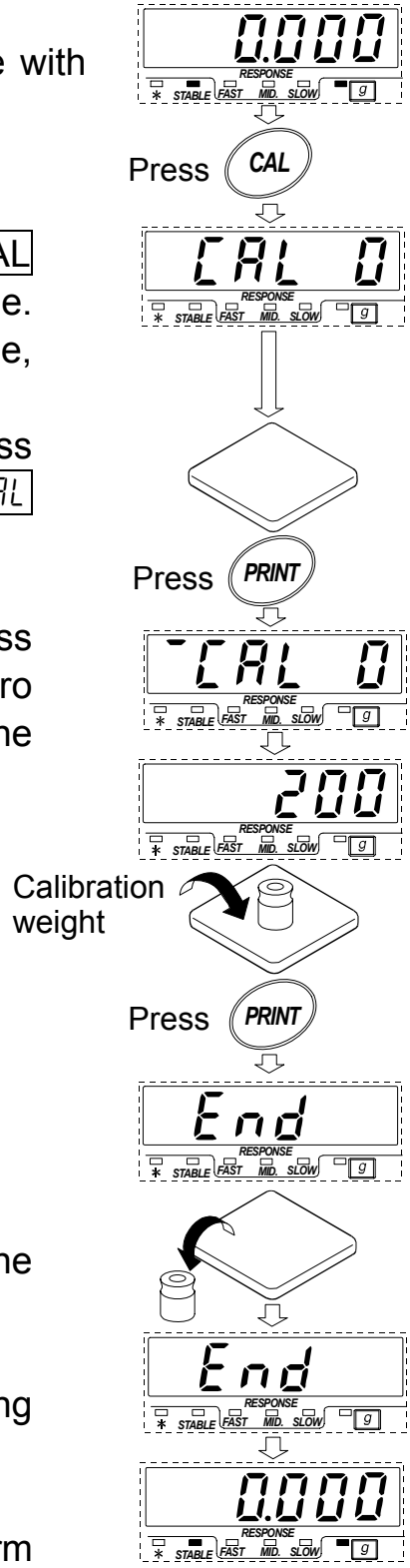
3. Confirm that there is nothing on the pan and press the PRINT key. The AD-4212C measures the zero point. Do not allow vibration or drafts to affect the AD-4212C.
   The calibration weight value is displayed.

4. Place a calibration weight, of the weight value displayed, on the pan and press the PRINT key. The AD-4212C measures the calibration weight. Do not allow vibration or drafts to affect the AD-4212C.

5. `End` is displayed. Remove the weight from the pan.

6. The display will automatically return to the weighing mode.

7. Place the calibration weight on the pan and confirm that calibration was performed correctly. If not, check the ambient conditions such as drafts or vibration, and repeat steps 2 through 7.



4. FUNCTION SETTING

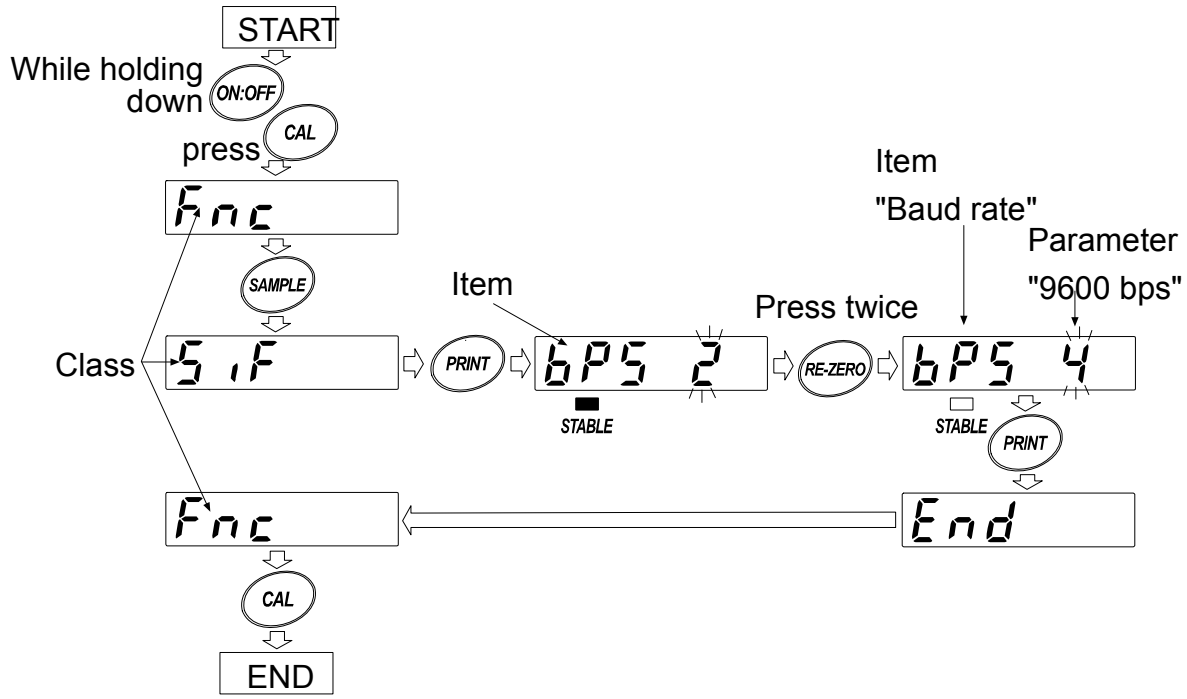
Function setting specifies the AD-8923-CC performance. The parameters are stored in non-volatile memory, and are maintained even if the power line or AC adapter is removed.

The function setting menu consists of two layers. The first layer is the “Class” and the second layer is the “Item”. Each item stores a parameter.

Press the SAMPLE key to select an item and press the RE-ZERO key to change the parameter. Then, press the PRINT key to store the new parameter.

Example

This example sets “Baud rate” to “9600 bps”.



Note

- **The AD-8923-CC may not function properly, depending on the settings and operating environment. Check the settings and change them as necessary.**

4.1. Display and keys

STABLE	The STABLE indicator turns on to indicate that the parameter displayed is in effect.
SAMPLE	Selects a class or item.
RE-ZERO	Changes the parameter.
PRINT	When a class is displayed, moves to an item in the class. When an item is displayed, stores the new parameter and displays the next class.
CAL	When an item is displayed, cancels the new parameter and displays the next class. When a class is displayed, exits the function setting mode and returns to the weighing mode.

4.2. Function table

Class	Item and Parameter		Description	
Fnc Environment Display	dPP Decimal point position	▪ -	Not fixed	Displays the decimal point position of the weight data received.
		0 ~ 5	Fixed	Fixes the decimal point at the set digit. Even if the minimum display is switched using the SAMPLE key, the decimal point position does not change. For details, refer to "6.3. Fixed decimal point position."
	SAPL Sample key function	0	Disabled	Disables the SAMPLE key function.
		▪ 1	Enabled	Enables the SAMPLE key function.
S1F Serial interface	bPS Baud rate	0	600 bps	Set the same value as that of the weighing instrument to be connected.
		1	1200 bps	
		▪ 2	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	
CCL CC-Link interface	Stn Station number	▪ 1 ~ 64	Station number	
	C-bP CC-Link baud rate	0	156 Kbps	Set the same value as that of the CC-Link master station to be connected
		1	625 Kbps	
		2	2.5 Mbps	
		3	5 Mbps	
		▪ 4	10 Mbps	

▪ Factory setting

4.3. Initializing the AD-8923-CC

Initialization restores the function settings of the AD-8923-CC to factory settings.

Operation

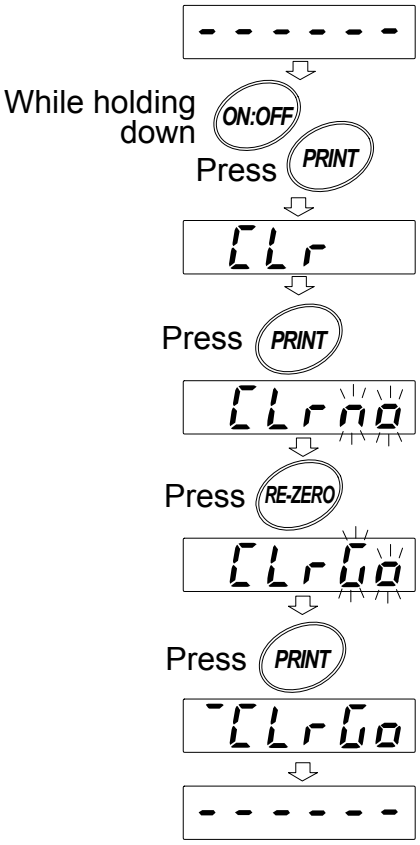
1 Turn the power on. [- - - - -] or weighing mode display appears.

2 While holding down the [ON:OFF] key, press the [PRINT] key. [CLr] is displayed.

3 Press the [PRINT] key.
To cancel this operation, press the [CAL] key

4 Press the [RE-ZERO] key to select "Go".

5 Press the [PRINT] key to perform initialization.
After initialization, [- - - - -] or weighing mode display appears.



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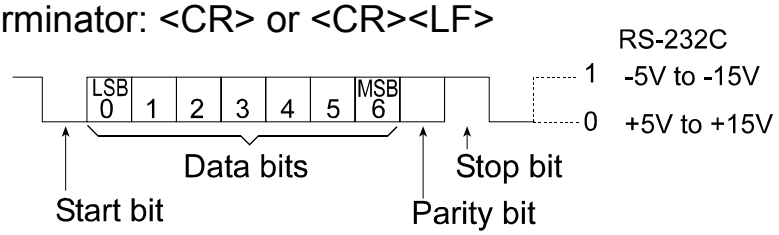
5. RS-232C CONNECTOR

The RS-232C cable provided with the AD-4212C can be connected directly.

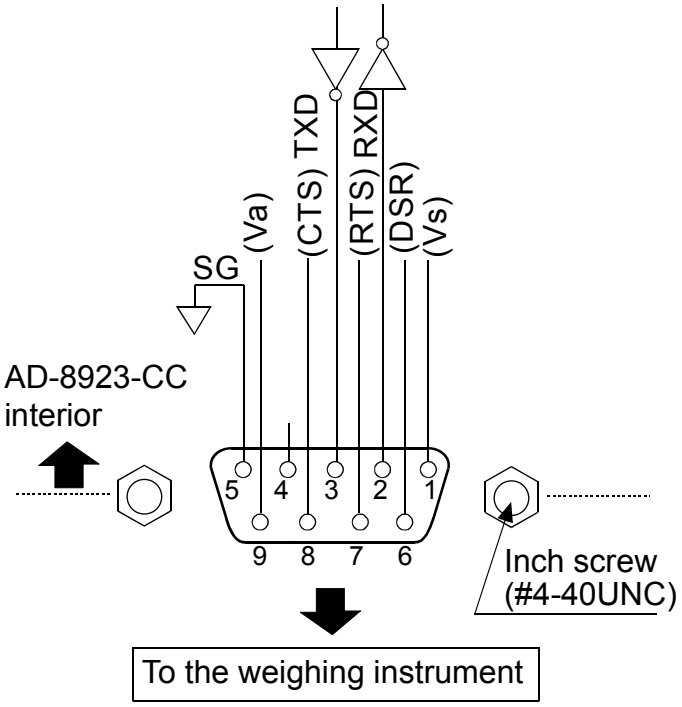
5.1. RS-232C serial interface specifications

RS-232C

Transmission system : EIA RS-232C
Transmission form : Asynchronous, bi-directional, half duplex
Data format : Baud rate : 600, 1200, 2400, 4800, 9600, 19200 bps
Data bits : 7 or 8 bits
Parity : EVEN, ODD (Data bits 7 bits)
NONE (Data bits 8 bits)
Stop bits : 1 bit or 2 bits
Code : ASCII
Terminator: <CR> or <CR><LF>



Circuit



Connection to the weighing instrument
D-Sub 9-pin

Pin No.	Signal name	Direction	Description
1	(Vs)	–	Used internally
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	–	–	N.C.
5	SG	–	Signal ground
6	(DSR)	–	Used internally
7	(RTS)	–	Used internally
8	(CTS)	–	Used internally
9	(Va)	–	Used internally

(The AD-8923-CC is a DTE device.
Connect to a DCE device such as the AD-4212C, using a straight through cable.)

Note

- **When the user prepares a cable, do not connect to the pins that are used internally.**

6. CC-Link CONNECTOR

The AD-8923-CC CC-Link is a remote device station of CC-Link ver.1.10. When a CC-Link is used, the AD-8923-CC can be controlled by the PLC remote I/O or remote registers. So, the program can be simple. And connection to a PLC is simple, thus, a weighing system can be built easily. The setting values of CC-Link are changed in the function setting CCL.

6.1. CC-Link interface specifications

Station number	1 to 64
Baud rate	156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps, 10 Mbps

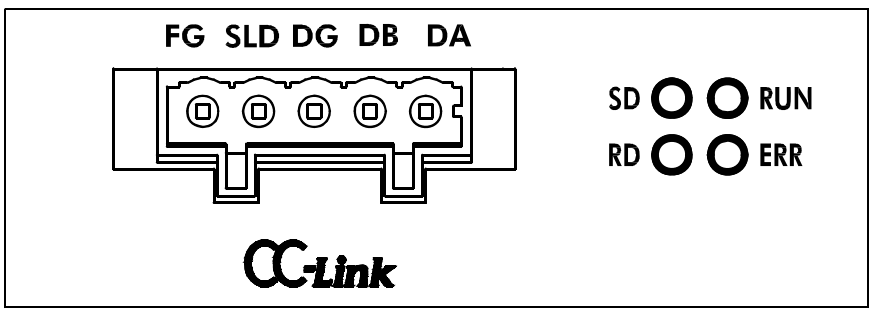
Communications connector

The connector used can be attached or removed while the power is ON. The function of each signal line is as follows.

DA	Signal DA
DB	Signal DB
DG	Signal ground
SLD	Shield
FG	Frame ground

Status LEDs

LED	ON	OFF	Blinking
RUN	Normal	• Resetting • No signal	–
SD	Transmitting	–	–
RD	Receiving	–	–
ERR	• Setting error • CRC error • Station trouble	Normal	When the setting values are changed



CC-Link connector and LEDs

Memory map

Remote register (Number of occupied stations: 1)
Blank “Name” column: internally reserved (not used).

AD-8923-CC --> Master station			Master station --> AD-8923-CC		
Remote register	Buffer memory	Name	Remote register	Buffer memory	Name
RWr0000	2E0	Weight value	RWw0000	2E0	
RWr0001	2E1		RWw0001	2E1	
RWr0002	2E2	Error code	RWw0002	2E2	
RWr0003	2E3	Error sub-code	RWw0003	2E3	

Remote I/O (Number of occupied stations: 1)
Blank “Name” column: internally reserved (not used).

AD-8923-CC --> Master station			Master station --> AD-8923-CC		
Remote input	Buffer memory	Name	Remote output	Buffer memory	Name
RX0000	0E0		RY0000	160	Re-zero
RX0001			RY0001		
RX0002			RY0002		Tare (Re-zero)
RX0003			RY0003		
RX0004			RY0004		
RX0005			RY0005		
RX0006		CPU operation	RY0006		
RX0007		Stable / Unstable	RY0007		
RX0008		Decimal point 2^0	RY0008		
RX0009		Decimal point 2^1	RY0009		
RX000A		Decimal point 2^2	RY000A		
RX000B			RY000B		
RX000C			RY000C		
RX000D			RY000D		
RX000E			RY000E		
RX000F			RY000F		
RX0010	0E1		RY0010	161	
RX0011			RY0011		
RX0012			RY0012		
RX0013			RY0013		
RX0014			RY0014		
RX0015			RY0015		
RX0016			RY0016		
RX0017			RY0017		
RX0018		Request flag of initialization	RY0018		Reply flag of initialization
RX0019		Reply flag of initial data setting	RY0019		Request flag of initial data setting
RX001A		Error status flag	RY001A		Request flag of error reset
RX001B		Remote READY flag	RY001B		
RX001C			RY001C		
RX001D			RY001D		
RX001E			RY001E		
RX001F			RY001F		

Numeric values of the remote register

All the values are hexadecimal. Negative values are expressed by the two's complement.

Decimal	Hexadecimal (32 bits)
-10	FFFFFFF6
-1	FFFFFFFF
0	00000000
1	00000001
10	0000000A

Weight value examples

1.000 will be 1000, thus expressed as 0x000003E8. (RWr0001: 0x0000, RWr0000: 0x03E8)

-1.000 will be -1000, thus expressed as 0xFFFFFC18. (RWr0001: 0xFFFF, RWr0000: 0xFC18)

Prohibited writing in the internally reserved areas

- Writing is prohibited in the internally reserved areas.
- Writing in the remote output (RY) and the remote register (RWw) of the internally reserved areas may cause the AD-8923-CC to malfunction.
- Values of the remote input (RX) and the remote register (RWr) of the internally reserved areas are not fixed.

Error code

Error code	Error status flag (Instrument error)
0	No error
1	-
2	EEPROM error (Writing error)
3	-
4	Calibration error
5	Weighing instrument error
6	RS-232C error
7	Over (+)
8	Over (-)

Stable / Unstable

RX0007	
0	Unstable
1	Stable

Decimal point

RX0008 to RX000A, 3-bit binary notation

RX000A	RX0009	RX0008	Decimal point position
0	0	0	No decimal point
0	0	1	First digit
0	1	0	Second digit
0	1	1	Third digit
1	0	0	Fourth digit
1	0	1	Fifth digit

Decimal point position example

When displaying 1.000, express 3 as a decimal point at the third digit, thus 0x011. (RX000A: 0, RX0009: 1, RX0008: 1)

Re-zero / Tare

Sets the weighing instrument to zero.

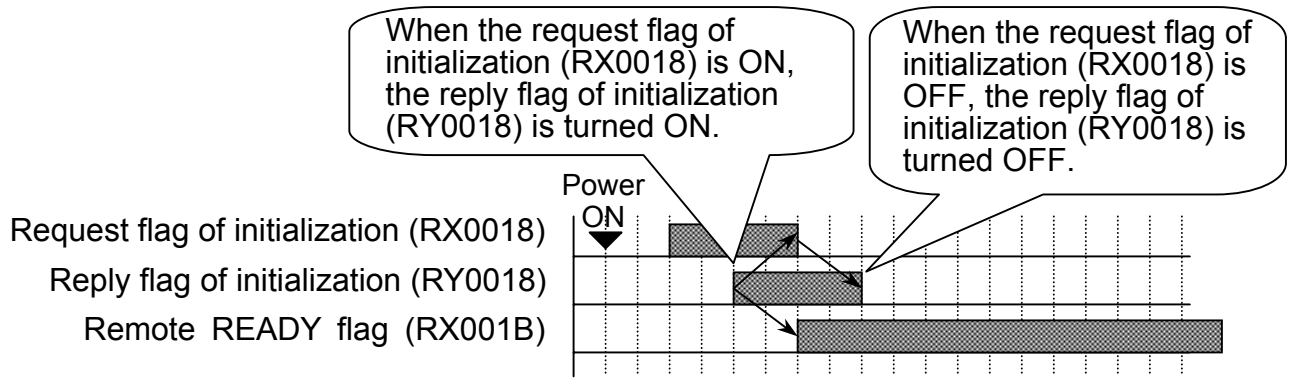
When the remote I/O register turns on (1), re-zeroing is performed.

6.2. Timing chart

Below examples are when the station number is set to 1.

When connecting to a power supply

When the AD-8923-CC is connected to a power supply and the CC-Link is ready, the request flag of initialization (RX0018) becomes active.
The master station confirms that RX0018 is active, performs initialization and turns the reply flag of initialization (RY0018) ON.
The AD-8923-CC turns the request flag of initialization (RX0018) OFF and turns the remote READY flag (RX001B) ON.
Turn OFF the reply flag of initialization (RY0018) in the master station.


When the request flag of initialization (RX0018) is ON, the reply flag of initialization (RY0018) is turned ON.
When the request flag of initialization (RX0018) is OFF, the reply flag of initialization (RY0018) is turned OFF.
Power ON
Request flag of initialization (RX0018)
Reply flag of initialization (RY0018)
Remote READY flag (RX001B)

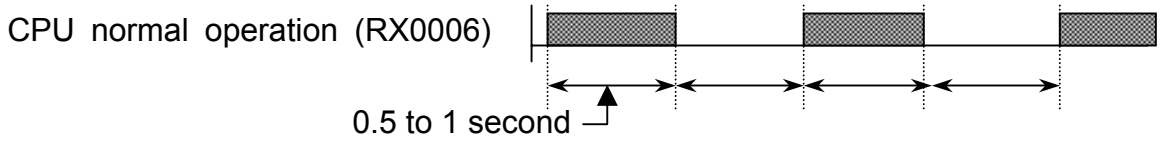
Performance upon power-ON

Resuming from suspended modes

When the AD-8923-CC is in a mode that suspends weighing, such as calibration or display-OFF, the remote READY flag (RX001B) becomes inactive because a correct weight value can not be output.
To resume from this condition, take the same steps as described in “When connecting to a power supply” above.

CPU operation

The CPU normal operation (RX0006) is a signal to check that the AD-8923-CC is connected to a power supply and it functions normally. During normal operation, the signal is reversed at an interval of 0.5 to 1 second.



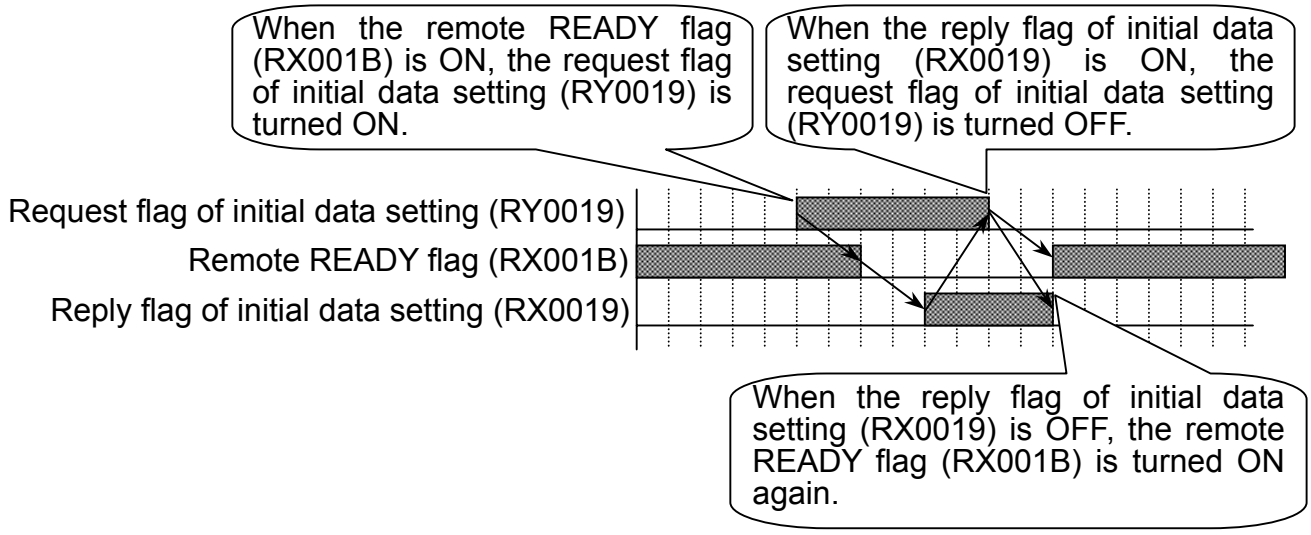
CPU normal operation signal

Requesting initialization from the master station

When requesting the initial data setting to the AD-8923-CC from the master station, turn the request flag of initial data setting (RY0019) ON while the remote READY flag (RX001B) is active.

The AD-8923-CC turns the remote READY flag (RX001B) OFF and performs initial data settings. When initial data settings are complete, the reply flag of initial data setting (RX0019) is turned ON.

Turn OFF the request flag of initial data setting (RY0019) in the master station.

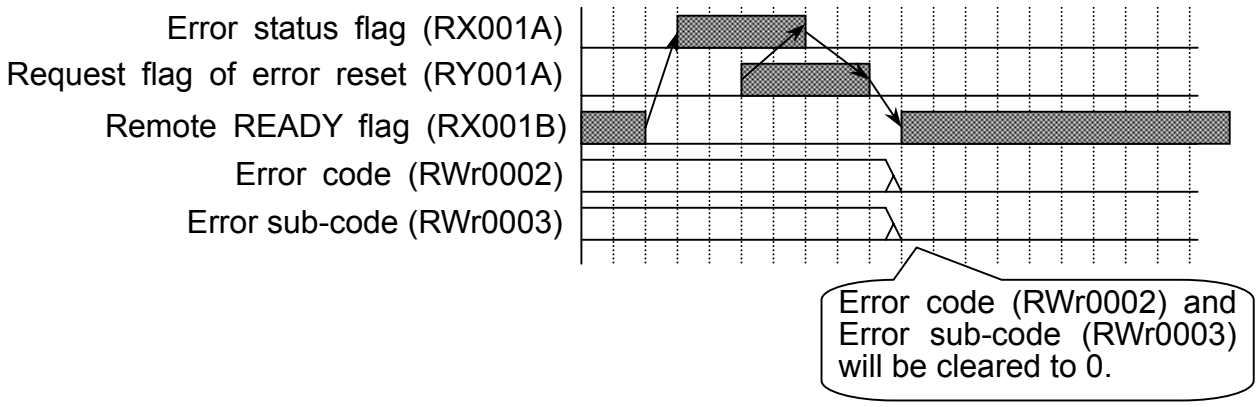

When the remote READY flag (RX001B) is ON, the request flag of initial data setting (RY0019) is turned ON.
When the reply flag of initial data setting (RX0019) is ON, the request flag of initial data setting (RY0019) is turned OFF.
Request flag of initial data setting (RY0019)
Remote READY flag (RX001B)
Reply flag of initial data setting (RX0019)
When the reply flag of initial data setting (RX0019) is OFF, the remote READY flag (RX001B) is turned ON again.

Performance of request flag of initial data setting

Error status flag

When an error occurs to the AD-8923-CC, the remote READY flag (RX001B) becomes inactive and the error status flag (RX001A) becomes active to inform the master station of the error occurrence.

The master station requests to reset the error status flag, by activating the request flag of error reset (RY001A).


Error status flag (RX001A)
Request flag of error reset (RY001A)
Remote READY flag (RX001B)
Error code (RWr0002)
Error sub-code (RWr0003)
Error code (RWr0002) and Error sub-code (RWr0003) will be cleared to 0.

Resetting the error status flag

6.3. Fixing the decimal point position

Using the function setting of dPP, the decimal point position of the value displayed on the AD-8923-CC and the decimal point position of the weight value output via CC-Link can be fixed.
In this way, even if the minimum display is switched using the SAMPLE key, the digit position for CC-Link output does not change.

Example 1: Does not fix the decimal point position (dPP -) Factory setting

Key	AD-4212C output	AD-8923-CC display	CC-Link output (Weight value) (Decimal point)
SAMPLE	S T , + 0 0 1 2 3 . 4 5 , ␣ ␣ g C_R L_F	123.46	12346 Second digit
	S T , + 0 1 2 3 . 4 5 6 , ␣ ␣ g C_R L_F	123.456	123456 Third digit

Note

- **␣ : space 20h**
- **When the minimum display is switched using the SAMPLE key, the digits of the weight values output via CC-Link don't align with each other.**

Example 2: Fixes the decimal point position to the third digit (dPP 3)

Key	AD-4212C output	AD-8923-CC display	CC-Link output (Weight value) (Decimal point)
SAMPLE	S T , + 0 0 1 2 3 . 4 5 , ␣ ␣ g C_R L_F	123.46	123460 Third digit
	S T , + 0 1 2 3 . 4 5 6 , ␣ ␣ g C_R L_F	123.456	123456 Third digit

Note

- **␣ : space 20h**
- **Even if the minimum display is switched using the SAMPLE key, the digits of the weight values output via CC-Link align with each other.**

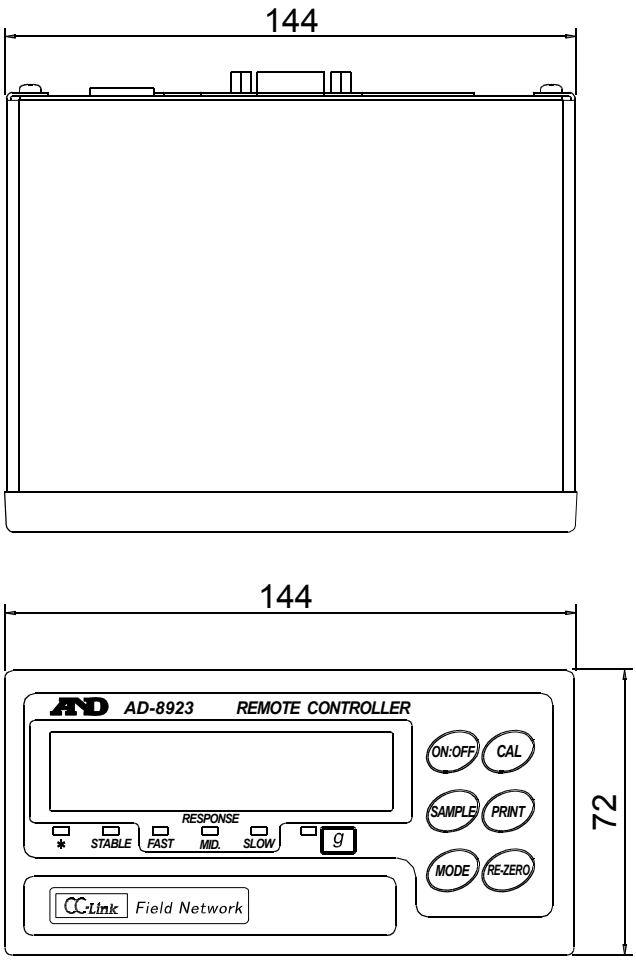
7. TROUBLESHOOTING

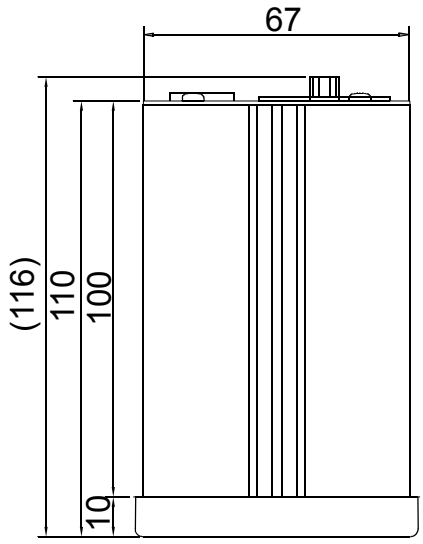
Symptom	Description
Error 10 appears.	Communication settings of the AD-8923-CC do not match with those of the weighing instrument. Check the settings such as baud rate and parity and correct them as necessary. For details, refer to “3.1. Setting the AD-4212C and the AD-8923-CC”.
----- (Bar display) remains and the weight value is not displayed.	• Is the data output mode of the weighing instrument set to “stream mode”? In a mode other than “stream mode”, the weight values are displayed only when they are transmitted. • Check if the communication settings are correct. • Check if the cables are the correct type and are not damaged.
The display flickers.	Electrical noise may cause this symptom. Ground the FG terminal located on the rear of the AD-8923-CC.

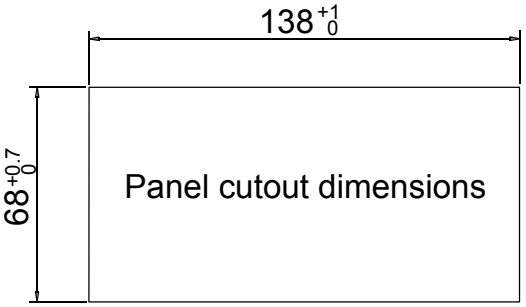
8. SPECIFICATIONS

Power supply	: External 24-VDC power supply (24 VDC±10% / 700mA) or AC adapter (Output: 12 VDC / 300mA) **Please confirm that the AC adapter type is correct for your local voltage and receptacle type.**
Transmission system	: RS-232C, CC-Link (CC-Link ver.1.10 remote device station)
Communications connector	: D-Sub 9-pin (male) (RS-232C connector to the weighing instrument) 5-pin (male) (CC-Link connector)
External dimensions	: 144 (W) X 110 (D) X 72 (H) mm
Mass	: Approx. 1.0 kg
Standard accessories	: CC-Link plug 1 pc. Connector operation lever 1 pc.

9. EXTERNAL DIMENSIONS







Panel cutout dimensions when panel mounted

Unit: mm

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